

Chapter 1

Introduction

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Chapter 1

Introduction

Welcome to the Hydrologic Engineering Center's Next Generation Reservoir Simulation (HEC-ResSim) computer program. At some time in the future, ResSim will be the successor to the "HEC-5, Simulation of Flood Control and Conservation Systems" program. ResSim is comprised of a graphical user interface (GUI), a computational program to simulate reservoir operation, data storage and management capabilities, and graphics and reporting facilities. The Data Storage System, HEC-DSS (HEC, 1995 and HEC, 2003b) is used for storage and retrieval of input and output time-series data.

1.1 ResSim Modules

ResSim offers three separate sets of functions called Modules that provide access to specific types of data within a watershed. These modules are **Watershed Setup**, **Reservoir Network**, and **Simulation**. Each module has a unique purpose and an associated set of functions accessible through menus, toolbars, and schematic elements. Figure 1.1 illustrates the basic modeling features available in each module.

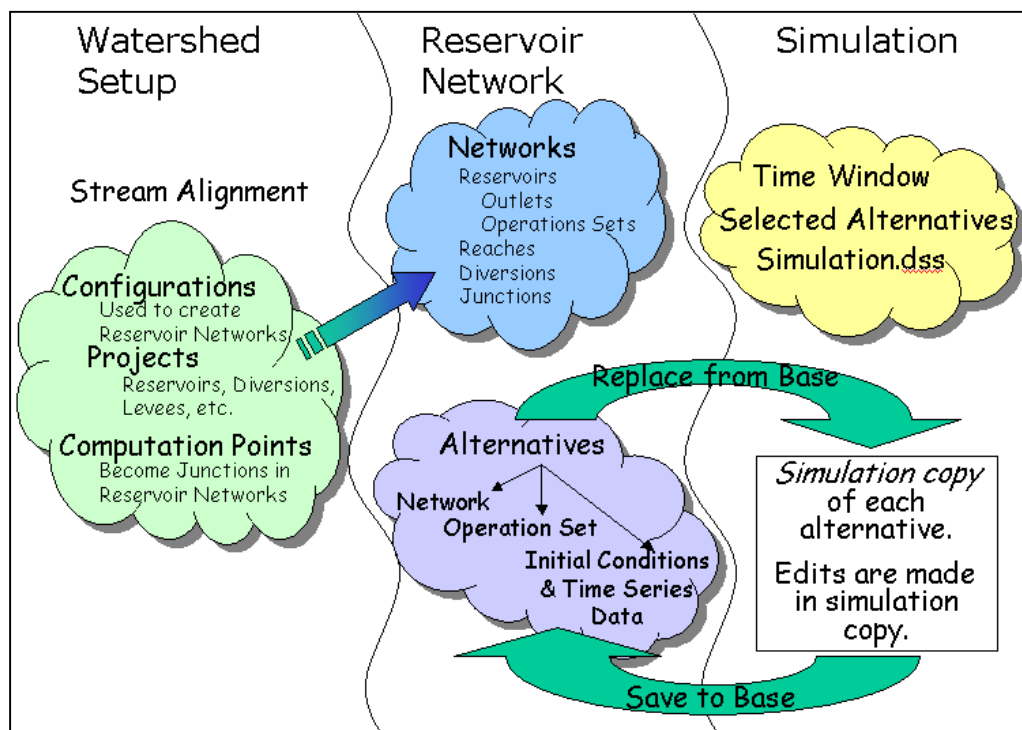


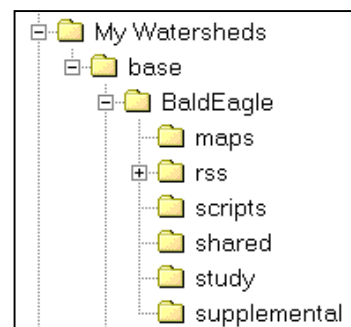
Figure 1.1 ResSim Module Concepts

1.1.1 Watershed Setup Module

The purpose of the Watershed Setup module is to provide a common framework for watershed creation and definition among different modeling applications. This module is currently common to HEC-ResSim, HEC-FIA, and the CWMS CAVI.

A watershed is associated with a geographic region for which multiple models and area coverages can be configured. A watershed may include all of the streams, projects (e.g., reservoirs, levees), gage locations, impact areas, time-series locations, and hydrologic and hydraulic data for a specific area. All of these details together, once configured, form a watershed framework.

When you create a new watershed, ResSim generates a directory structure (see figure at right) for all files associated with the watershed.



In the Watershed Setup module, you assemble items that describe a watershed's physical arrangement. Once you have created a new watershed, you are able to import maps from external sources, specify the units of measure for *viewing* the watershed, add layers containing additional information about the watershed, create a common stream alignment, and configure elements. You can also add projects and create time-series icons within the Watershed Setup module.

Chapters 3 through 7 describe the Watershed Setup module in more detail.

1.1.2 Reservoir Network Module

The purpose of the Reservoir Network module is to isolate the development of the reservoir model from the output analysis. In the Reservoir Network module, you will build your river schematic, describe the physical and operational elements of your reservoir model, and develop the alternatives that you want to analyze. Using configurations that are created in the Watershed Setup module as a template, you will create the basis of a reservoir network. You will then add routing reaches and possibly other network elements to complete the connectivity of your network schematic. Once the schematic is complete, physical and operational data for each network element are defined. Also, alternatives are created that

specify the reservoir network, operation set(s), initial conditions, and assignment of DSS pathnames (time-series mapping).

Chapters 8 through 13 describe the Reservoir Network module in more detail.

1.1.3 Simulation Module

The purpose of the Simulation module is to isolate output analysis from the model development process. Once the reservoir model is complete and the alternatives have been defined, the Simulation module is used to configure the simulation. The computations are performed and results are viewed within the Simulation module.

When you create a simulation you must specify a simulation time window, a computation interval, and the alternatives to be analyzed. Then, ResSim creates a directory structure within the rss folder of the watershed that represents the “simulation”. Within this “simulation” tree will be a copy of the watershed, including only those files needed by the selected alternatives. Also created in the simulation is a DSS file called simulation.dss, which will ultimately contain all the DSS records that represent the input and output for the selected alternatives. Additionally, elements can be edited and saved for subsequent simulations.

Chapter 14 describes the Simulation module in more detail.

1.2 About this Manual

This User's Manual is the primary reference for providing ResSim users with detailed instructions for creating ResSim models and analyzing simulation results. With the exception of the first and second chapters, (which deal with introductory and core concepts), the chapters of this manual group tasks according to module. Each chapter provides an overview of key concepts and a detailed description of screen components and tools available in the module, and then shows you how to carry out specific tasks in the module. Appendices cover topics and tasks that require levels of detail beyond the scope of an individual chapter.

The organization of this manual is summarized in Table 1.1.

Table 1.1 Summary of Contents of HEC-ResSim User's Manual

HEC-ResSim Module	If you want to find out...	Refer to...
Watershed Setup	Concepts of HEC-ResSim	Chapter 2
	How to create and manage watersheds	Chapter 3
	How to work with map layers	Chapter 4
	How to establish a stream alignment	Chapter 5
	How to create and define watershed elements and projects (e.g., reservoirs, levees, etc.)	Chapter 6
	How to create computation points (hydrograph locations)	Chapter 6
	How to create watershed configurations	Chapter 7
Reservoir Network	How to develop reservoir networks	Chapter 8
	How to edit element data (junctions, routing reaches and diversions)	Chapter 9
	How to define physical reservoir data	Chapter 10
	How to edit physical reservoir data	Chapter 10
	How to develop reservoir operation data	Chapter 11
	How to define reservoir systems	Chapter 12
	How to define alternatives	Chapter 13
Simulation	How to develop and execute simulations	Chapter 14
	How to analyze results	Chapter 14
	How to calibrate model	Chapter 14
	How to manage simulations	Chapter 14
	Detailed application settings	Appendix A
	How to define the coordinate system	Appendix B
	How to edit maps	Appendix C
	How to change colors	Appendix D
	How to use HEC-DSSVue	Appendix E
	How to copy, export, and print tables	Appendix F
	References	Appendix G